already the poison is present in the blood. No one argues that it will cure the disease, but that it will relieve a condition of which the patient may die, even before the virus of the disease would otherwise kill him; and that, therefore, we prolong the time for the actions of general remedies. But, beyond this, it is to be borne in mind that a mechanical obstruction in the larynx is itself producing poisoning in the shape of heavily carbonised blood. A child with scalded glottis will die of blood-poison generated within itself, if the obstruction be not removed; and those who oppose tracheotomy in diphtheria and croup are in the position of allowing a second and removable poison to operate, in addition to that already existing in the blood.

Having said so much in defence of the operation in general, I may say a few words as to some practical points which tend to render it successful. The operation is by no means an easy one. I have seen more than one fatal, and several nearly fatal, results on the table. I think that chloroform ought to be given, except where the child is already narcotised by blood-poison. It lessens the dangers, and facilitates the operation. A moistened atmosphere ought to be provided by means of a regular croup-kettle, the current of steam being directed towards the patient's head.

The suprathyroid operation diminishes the risks. It is as favourable as the infrathyroid, the theory of which is that you are likely to get below the membrane. But the theory goes for nothing. In both my successful cases, the membrane extended far below the opening. In one, I removed a large piece with a forceps passed down to the bifurcation of the trachea; in the other, the membrane was expelled subsequently. It is always most convenient to secure the trachea with a hook before opening, and for that purpose an ordinary tenaculum is best. This being fixed somewhat to the side of the median line of the trachea, an incision may at once be made, and the tube be introduced before the tenaculum is removed. I prefer a small tenotome for the tracheal incision. It slips between the rings without any force. The tube should be as large as the trachea will hold. I believe I lost one case by using one too small.

As to the tube itself, I have always used Fuller's ordinary bivalve; but, if the neck be deep, it is often difficult to slip the ends of the blades into the tracheal wound. A better instrument is that with two parallel blades—one movable, and fitting into the other until this is introduced. Then, by a small crank fixed to the shield, the blades of the cannula can be separated, and a tube of suitable size inserted. Very much depends upon careful nutrition and skilful nursing. At any moment, asphyxia may follow from blocking of the tube by a loosened membrane, and the child may be lost if some one be not present to relieve the obstruction. If it cannot be done by passing down a feather, the tube ought to be taken out at once. There will be no difficulty in putting it back after the first twenty-four hours, as the parts will remain patent. The viscid secretion collects in the trachea, and brings on paroxysms of coughing. In the cases which were successful, I had a spray of lactic acid solution (ten grains to the ounce) in one instance, and of lime-water in the other, thrown across the orifice of the tube. It was the experience of those watching that the relief given was very great, and that the membrane was more readily expectorated. The last patient always signed for the spray when the paroxysm came on, and was evidently himself conscious of the advantage of it. It may be that the virtue lay in the simple moistening of the tube, and not in any solvent powers of the fluids; but the fact is as I have said.

From what I have seen, even in non-successful cases, I cannot withhold from any patient the relief and the hope of life which this operation offers. It is one that is surrounded by difficulties, and is too often followed by death; but, until those who oppose it can offer some better substitute, I, for one, feel it my duty to recommend it and to practise it.

TRACHEOTOMY IN DIPHTHERIA AND CROUP.

By GEORGE BUCHANAN, A.M.,
Professor of Clinical Surgery in the University of Glasgow.

THE following case is recorded, because it affords some lessons which can never be too often enforced. In speaking of my experience in tracheotomy, I have sometimes been met with the observation, that no doubt some of my cases have been examples of simple spasmodic croup, and that, if I had waited longer, the fits would have passed off and the child recovered without operation. But, in reply, I can say that in most if not in all the cases the child was approaching or had actually arrived at a stage, when life could no longer be supported without an additional supply of air to the lungs, whatever was the cause of the necessary quantity being prevented from entering. Secondly, simple spasmodic croup or *laryngismus stridulus* is a very rare affection; indeed, I have never seen it among the cases of approaching suffocation to which I have been called. Thirdly, and this is the point on which I wish to insist, because it is of practical importance—in all cases of croup and tracheal diphtheria, there is an element of spasm, intermittent, sometimes with long intervals of relief, which leads to the belief that the obstruction is not permanent, but only occasional, and often causes the operation to be too long delayed. As the disease advances, the spasms become more frequent, and end in a continuous obstruction, which then, but often too late, is recognised as depending on mechanical narrowing of the trachea.

Of course, it is familiarly known that the suffocation of croup and diphtheria may depend on two different conditions. First, it may be caused by the obstruction being situated in the trachea and larynx; second, it may depend on the viscid secretion extending down into the bronchi and smaller bronchial tubes, thus stuffing up the lungs and preventing either the free ingress or egress of air. To either of these conditions the element of spasm may be added; and, as this is often the most prominent and alarming feature, it may mask either of the other two, or render it difficult to decide which is the real essence of the disease.

But I have long ago pointed out a diagnostic mark which cannot be too frequently insisted on and promulgated, and which is the only true means for enabling us to decide when tracheotomy *is* justifiable and when it *is not*—viz., the respiratory movements as seen by observing the naked chest. When the obstruction is situated in the trachea or larynx, the lungs remaining normal, the efforts of the child to obtain breath are painfully visible by the powerful drawing inwards of the ensiform cartilage, the intercostal spaces, and every elastic part of the chest-wall; showing the thirst for air, and the capacity of the lungs to receive it, if only it could gain entrance. But when the smaller bronchial tubes are full of viscid and perhaps pseudo-membranous effusion, the movements of the chest-wall are impeded; the chest is puffed out like one affected with chronic emphysema of the lung, and heaves in a mass with difficulty.

In the first of these cases, tracheotomy affords instant relief—often permanent—and ultimate saving of life; in the second, if unfortunately it be performed, it affords at best a temporary and short interval of repose, if even that, and only when the element of spasm is present.

It will be seen that in these few remarks I have avoided all reference to the disputed question as to the identity or non-identity of croup and diphtheria. I leave that to those who, as general practitioners, see the diseases in their early stage. As a surgeon, I am only concerned with cases in which it has become probable that tracheotomy may be required. My remarks apply to all cases, whatever may be the original malady, in which it appears nearly certain that the patient will die of *suffocation* from *obstruction* situated in the *larynx or trachea* unless a free supply of air is obtained by tracheotomy. And I have given the diagnostic mark on which I now invariably rely in determining whether to perform or refrain from performing tracheotomy.*

I shall now give a short report of my last case. Peabody Grierson, a boy aged 8, in previous good health, a stout well-formed boy, on Saturday, November 15th, 1879, began to complain of his throat, with a slight tickling cough coming at intervals, with some slight feeling of choking. On Sunday, the 16th, Dr. Pirie was called, who detected incipient croup by the fever, flushed face, pain in the neck, and a crowing sound with the cough, which came at intervals. Ipecacuan, mustard blisters, steam in the apartment, were kept up till Monday at 8 A.M., when I saw the patient with Dr. Pirie. The spasms, though severe, were not frequent; and in the intervals the breathing was fairly normal; so we determined to delay changing the treatment for some hours. In the afternoon, it became quite evident that the spasms, which were becoming more frequent and severe, were only the reflex effect of a permanent obstruction in the trachea. At no time was there any inflammation, swelling, or false membrane, to be seen on tonsil, palate, or fauces. The agony of the little sufferer was very painful to witness, and the diagnostic mark of the powerful indrawing of the intercostal spaces was as characteristic as I ever saw it. I sent for Dr. Pirie, and drove home for my instruments and an assistant; and, by the time I got back, the case was indeed urgent. In fact, it seemed as if we were too late. The lips were livid; the face pallid, and covered with a cold sweat; the pulse flagging; the breathing very laboured; the eyes staring, open, and glazed: in fact, the child seemed *in articulo mortis*, and I said to his mother that I feared it was too late. I have rarely heard a more piteous appeal. The mother was an intelligent woman, who had been educated as a nurse in Guy's Hospital, and had afterwards come to Glasgow Royal Infirmary, where

* For a more detailed account of the varieties of croup and diphtheria, and the diagnosis of the cases suitable and unsuitable for operation, see my paper in the BRITISH MEDICAL JOURNAL for September 4th, 1875; see also a Clinical Lecture in BRITISH MEDICAL JOURNAL for March 4th, 1871; also for February 14th, 1880.

she for several years had charge of my emergency ward, and where she nursed for me, to a successful termination, one or two cases of tracheotomy. She said: "I see by your face that there is little encouragement to operate; and, if you think there is no hope, do not do it; but, if you think there is any chance of success, as death is fast approaching, for the love of God, try to save my boy."

I operated without chloroform, as the child was rendered almost insensible to pain by the carbonisation of the blood. The white rings of the trachea were rapidly exposed in the bottom of the wound, and a free incision was made into the tracheal tube. This was followed by the usual result—a struggle, a forcible expiration, during which shreds of tough membrane and viscid mucus were expelled. Presently the breathing became quiet. During this time, the lips of the wound in the trachea were held apart by the opened blades of a dressing-forceps. The silver tube was easily introduced, and the little patient was left breathing calmly and easily.

He remained very well during the night; but next morning, at 7 A.M., I was called. The breathing through the tube had become rather obstructed and whistling: the inevitable sign of a dryness of the tracheal secretion. I passed into the tube a soft feather well moistened with tepid water, and mopped out the lower end of the outer silver tube and the trachea itself, when a convulsive cough took place and a large piece of a membranous cast of the trachea was expelled through the tube with great force. I now directed the mouth of the tube to be kept constantly covered with a bit of honeycomb-sponge wrung out of hot water, which I find by far the most effectual way of moistening the entering air. After this, there was no more trouble with the case. The tube was removed on the eighth day, and the child made an excellent recovery.

STATISTICS OF TRACHEOTOMY.—I have now performed this operation for croup and diphtheria fifty times. I have entered as cases of diphtheria all such as had an effusion of white false membrane on the tonsils, palate, or fauces. The particulars of the cases, with the ages, are given in the following table.

Case.	Disease.	Age.	Result.
1	Croup	6	Cured
2	Croup	3½	Death in three hours
3	Croup	3	Death immediately
4	Croup	1¼	Death in sixteen hours
5	Diphtheria	2	Death immediately
6	Diphtheria	2½	Death in six hours
7	Croup	1½	Death in eight hours
8	Croup	3	Death in twenty-four hours
9	Diphtheria	4	Cured
10	Diphtheria	2½	Cured
11	Diphtheria	1¾	Death in twenty-four hours
12	Croup	5	Cured
13	Diphtheria	2½	Death in forty hours
14	Croup	5	Cured
15	Diphtheria	5	Death in twenty-eight hours
16	Diphtheria	5½	Death in five days
17	Diphtheria	6	Cured
18	Diphtheria	3	Death in four days
19	Diphtheria	3½	Death in seven days
20	Diphtheria	2	Death in five days
21	Diphtheria	2½	Cured
22	Diphtheria	6	Death in two days
23	Diphtheria	5	Cured
24	Diphtheria	8	Death in thirteen days
25	Croup	1½	Death in six hours
26	Croup	5	Cured
27	Diphtheria	5	Death in five days
28	Diphtheria	7	Cured
29	Croup	5	Death in three days
30	Diphtheria	5	Cured
31	Diphtheria	2	Death in two days
32	Croup	2½	Death in two days
33	Diphtheria	5	Death in six days
34	Croup	9	Cured
35	Croup	4	Death in three days
36	Diphtheria	8	Death in eight days
37	Diphtheria	7	Cured
38	Diphtheria	7	Death in three days
39	Diphtheria	5	Cured
40	Diphtheria	5	Death in two days
41	Diphtheria	4	Death in three days
42	Diphtheria	6	Cured
43	Diphtheria	4	Death in two days
44	Croup	7	Cured
45	Croup	9	Death in four days
46	Diphtheria	6	Cured
47	Diphtheria	7	Cured
48	Diphtheria	4	Death in two days
49	Diphtheria	5	Death in two days
50	Croup	8	Cured

Total tracheotomies, 50; cured, 19; deaths, 31.
Tracheotomy in croup, 17; cured, 7; deaths, 10.
Tracheotomy in diphtheria, 33; cured, 12; deaths, 21.

RESULTS.—Taking the whole of the cases, the result is, that nearly *two* out of every *five* operations were successful; and, as the operation was never performed unless there was no hope of recovery otherwise, it may be fairly stated that the lives of these nineteen children were *saved* by tracheotomy.

CLINICAL MEMORANDA.

SPREAD OF TYPHOID FEVER TO ANIMALS.

I HAVE read with great interest Dr. Cayley's Croonian Lecture in the JOURNAL of March 20th. With regard to the contamination of veal, etc., I may mention the following case, which recently came under my notice.

About a month ago, I was called to see a young girl, the daughter of a small farmer, who had been sent home ill from service. Her symptoms, at first obscure, soon developed into unmistakable typhoid fever; and in a short time, four other children in the house were seized. A week after the girl was sent home, all the animals in the adjacent farmyard, except the pigs and ducks, were taken ill, their symptoms being purging and extreme depression. The hens, whose roost communicated with the privy down which the typhoid stools were thrown, suffered most, a fine brood of chickens being nearly all destroyed. The cowshed was also near the privy, and the cow aborted after two days' illness.

I think this case worthy of attention. Might not the disease have been spread by the eggs, or by the chickens if they had been sent to market? The milk and butter were condemned by the sanitary inspector. The children are all convalescent; and, after the first week, the stools were buried by my orders, and the fowls gradually recovered.

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PAGET'S DISEASE OF THE NIPPLE FOLLOWED BY CANCER OF THE BREAST.

As this subject has attracted a good deal of attention since Mr. Henry Morris and Dr. Thin brought it prominently under the notice of the Royal Medical and Chirurgical Society, perhaps the following case will be interesting.

In March 1879, I was consulted by Mrs. A. She was a healthy-looking woman, about thirty-six years of age, and had several children, the youngest early in 1878. When I saw her, the left nipple and areola were diseased, and presented an appearance exactly similar to that described by Sir James Paget in 1874. The surface was "florid, intensely red, raw, very finely granular", and appeared as though the whole thickness of the epidermis and part of the cutis had been removed. It did not look in the least like eczema, nor had it the clinical appearances of cancerous ulceration. There was a copious exudation from the raw surface. At the upper part of the gland, there was a distinct tumour, over which the skin was not movable. "A clear interval of apparently healthy tissue" separated the nipple and tumour. She stated that the nipple had been sore for about two years, and that the tumour was not noticed by her until six months previous to the date on which I first saw her. In these statements she emphatically persisted. Another medical man saw her with me; and, although some of the glands of the axilla were enlarged, we recommended excision of the breast as the only chance of prolonging life: an operation to which she would not consent. Subsequently, the case ran a very rapid course, and she sank in the following August. A *post mortem* examination was not made. This case differed from that of Mr. H. Morris in not having distinct morbid changes connecting the tumour and the seat of the "eczema", and thus agreed with the cases reported by Sir J. Paget. It also ran a very rapid course from the time the tumour was first noticed, even allowing a margin for errors in the history given to me by the patient; and it does not add weight to the statement that these tumours are not so rapidly fatal as ordinary scirrhus.

I regret that the histological characters of the tumour could not be determined; but I think that the case is not barren of clinical facts. 1. The disease of the nipple was at once recognised as that described by Sir James Paget in *St. Bartholomew's Hospital Reports*, 1874, though I had not seen such a case before. It was altogether different from eczema or cancer; but it must be remembered that I saw it two years after its appearance. How soon the appearances became characteristic is an interesting question, and I would be inclined to say they were so long before they came under my notice. 2. This disease of the nipple appears to have been present eighteen months before a tumour was noticed, which tumour took on malignant characters, and destroyed life in about twelve months. 3. As in scirrhus, the lymphatics became involved, and the axillary and clavicular glands enlarged rapidly.

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